

**ECTS CREDIT TEACHING SYSTEM IN THE FACULTY OF PHARMACY
AT THE MEDICAL UNIVERSITY – SOFIA**

First academic year

First semester		Second semester	
SUBJECT	CREDITS	SUBJECT	CREDITS
Pure Mathematics	4.5	Applied Mathematics	3
Biology	6	Inorganic Chemistry	6
History of Pharmacy	2	Physics and Biophysics	6
Inorganic Chemistry	5.5	Latin	2
Physics and Biophysics	4	Foreign Language	4
Latin	2	Sports	2
Foreign Language	4	Anatomy and Physiology	7
Sports	2		
30		30	

Second academic year

Third semester		Fourth semester	
SUBJECT	CREDITS	SUBJECT	CREDITS
Anatomy and Physiology	4	Analytical Chemistry	7
Computer Techniques	2	Organic Chemistry	7
Analytical Chemistry	8	Microbiology	4
Organic Chemistry	10	Sports	2
Microbiology	4	Pharmaceutical Botany	5
Sports	2	Physical Chemistry	5
30		30	

Third academic year

Fifth semester		Sixth semester	
SUBJECT	CREDITS	SUBJECT	CREDITS
Pharmaceutical Botany	4	Pharmaceutical Chemistry	7
Physical Chemistry	5	Pharmaceutical Technology & Biopharmacy	7
Pharmaceutical Chemistry	7	Biochemistry	2
Pharmaceutical Technology & Biopharmacy	6	Medical Technique and Instruments	2
Biochemistry	2	Pharmacognosy, Part 1	7
Clinical Chemistry	3	Pharmacology	5
Hygiene and Ecology	3		
30		30	

Fourth academic year

Seventh semester		Eighth semester	
SUBJECT	CREDITS	SUBJECT	CREDITS
Pharmaceutical Technology & Biopharmacy, Part 2	6	Pharmaceutical Technology & Biopharmacy, Part 2	6
Pharmaceutical Analysis	6	Pharmaceutical Analysis	6
Pharmacology	6	Toxicology	4
Social Pharmacy	4	Social Pharmacy	4
Pharmacognosy	6	Pharmacognosy, Part 2	5
Pathoanatomy and Pathophysiology	2	Medical Genetics	2
		Clinical Medicine and Pharmacotherapy	3
	30		30

Fifth academic year

Ninth semester	
SUBJECT	CREDITS
Basics of Clinical Medicine	4
Pharmaceutical Technology & Biopharmacy, Part 3	7
Bromatology	4
Modern Requirements to the Production of Drugs	5
Subsidiary subject	5
Subsidiary subject	5
	30

DEGREE COURSE IN PHARMACY

Subject	Total	Lectures	Practicals	I year		II year		III year	
				I	II	III	IV	V	VI
1.Pure Mathematics	75	30	45	2/3*					
2.Biology	105	60	45	4/3*					
3.History of Pharmacy	30	30	-	2/0**					
4.Inorganic Chemistry	165	60	105	2/4	2/3*				
5.Physics and Biophysics	150	60	90	2/3	2/3*				
6.Applied Mathematics	45	15	30	1/2**					
7.Latin	60	-	60	0/2	0/2c.r.				
8.Foreign Language	120	-	120	0/4	0/4c.r.				
9.Sports	120	-	120	0/2	0/2	0/2c.r.			
10. Human Physiology	120	60	60	-	2/2	2/2*			
11. Human Anatomy	45	30	15	-	2/1				
12. Computer Technologies	30	-	30	-	-	0/2**			
13. Analytical Chemistry	240	60	180	-	-	2/6	2/6*		
14. Organic Chemistry	270	90	180	-	-	3/6	2/6*		
15. Microbiology	120	60	60	-	-	2/2	2/2*		
16. Physical Chemistry	180	60	120	-	-	-	2/4	2/4*	
17.Pharmaceutical Botany	150	60	90	-	-	-	2/3	2/3*	-
18. <i>Technical Drawing</i>	30	-	30	-	-	-	-	0/2**	
19. Pharmaceutical Chemistry	225	90	135	-	-	-	-	3/2/3	3/2/3*

Subject	Total	Lectures	Practicals	III year		IV year		V year
				V	VI	VII	VIII	IX
20. Biochemistry and Clinical Chemistry								
-Biochemistry	75	30	45	2/3				
-Clinical Chemistry	60	15	45		1/3*			
21. Pharmaceutical Technology & Biopharmacy, Part 1	210	60	150	2/5	2/5*			
22. Medical Techniques	45	-	45		0/3**			
23. Pharmacognosy, Part 1	210	60	150		2/5	2/5*		
24. Pharmacology	180	60	120		2/3	2/3/2*		
25. Hygiene and Ecology	45	30	15			2/1*		
26. Pathoanatomy and Pathophysiology	60	30	30			2/2**		
27. <i>Processes and Apparatuses</i>	90	45	45			3/3*		
28. <i>Cosmetics</i>	90	30	60			2/4*		
29. Pharmaceutical Technology & Biopharmacy Part 2	225	60	165			2/5	2/6*	
30. Pharmaceutical Analysis	225	60	165			2/5	2/6*	
31. Toxicology	90	30	60				2/4*	
32. Organization and Economy*** a) of Pharmaceutical Production b) of Pharmacy	150	60	90			2/3	2/3*	
33. Medical Genetics	30	15	15				1/1**	
34. <i>Chemical-Pharmaceutical Technology</i>	150	45	105				3/6*	
35. Clinical Medicine and Pharmacotherapy	120	60	60				2/1/1	2/1/1*

Subject	Total	Lectures	Practicals	IV year		V year
				VII	VIII	IX
36. Pharmaceutical Technology & Biopharmacy, Part 3	120	30	90			2/6*
37. Bromatology	60	30	30			2/2*
38. Modern Requirements to the Production of Drugs	90	30	60			2/4*
39. <i>Biotechnology</i>	90	30	60			2/4*
40. Subsidiary subject	60	30	30		2/2	2/4*
41. Subsidiary subject	90	30	60			2/4*
42. Practical work in Pharmacies, Industrial Companies, Analytical laboratories etc.						Practical work

Training-load	General profile	Industrial profile
Lectures	1530 h	1650 h
Practicals	2790 h	3090 h
Seminars	135 h	135 h
Total	4425 h	4875 h

Notes: The objects written in italic refer to the industrial profile

c.a. = Continuous assessment

* Examination

** Passing (on the “yes” or “no” basis)

*** For the general profile (a) : (b) 1 : 2; for the industrial profile (a) : (b) 2 : 1

PURE MATHEMATICS

ECTS CREDITS: 4.5

PRE-REQUISITES: Successful completion of secondary education

HORARIUM: Lectures	Hours per week - 2	Weeks – 15
practicals	Hours per week - 3	Weeks - 15

SEMESTER: I

CONTENTS: Elements of linear algebra and analytical geometry, elements of the theory of numerical series and numerical functions of one or two variables, elements of differential and integral calculus, elements of the theory of ordinary differential equations.

OBJECTS: Gaining of knowledge of the basic fields of higher mathematics necessary for the understanding of the quantitative methods and models in physical chemistry, biochemistry and pharmacology, and of capability of unaided solution of some of the often encountered problems in pharmaceutical research.

ASSESSMENT: Examination in two stages - practical and theoretical parts.

ECTS CREDITS: 6

PRE-REQUISITES: successfully passed entry exams on biology and chemistry.

HORARIUM: Lectures	Hours per week - 3	Weeks - 15
Practicals	Hours per week - 3	Weeks - 15

SEMESTER: I

CONTENTS:

OBJECTIVES:

ASSESSMENT: Continuous assessment during the practicals, colloquium and theoretical examination at the end of the semester, including work in written.

LATIN

ECTS CREDITS: 4

PREREQUISITES: None

HORARIUM:

Seminars

Hours per week - 2

Weeks - 30

SEMESTER: I and II

CONTENTS: Notion of the Latin verb and the use of the imperative mood and some verbal forms in pharmaceutical terminology.

Noun, adjective and numeral and their use in the specialized pharmaceutical language. Word-building: prefixes, suffixes, term elements of Latin and Greek origin by means of which the complex medical and pharmaceutical terms have been created and are created at present. General rules in chemical nomenclature and in the formation of the denomination of drugs.

Basics of the botanical nomenclature.

Basic terms in pharmacognosy. Prescription - principles in making out a prescription, specific formulae in Latin and generally accepted abbreviations.

OBJECTS: Formation of a stable terminological basis in the beginning of the education in pharmacy which would facilitate the gaining of knowledge on the other objects foreseen in the teaching program.

ASSESSMENT: Current control - oral and written, semester works in written.

ENGLISH

ECTS CREDITS: 4

PRE-REQUISITES: Knowledge of the language acquired during the studies in the secondary school and rating in the respective diploma.

HORARIUM:

Seminars	Hours per week - 4	Weeks - 30
----------	--------------------	------------

SEMESTER: I and II

CONTENTS: Human anatomy; disease: its symptoms and treatments; history of pharmacy; the scope of pharmacy today; basic botanical terms, basic drug formulations; topical corticoids, antibiotics, neurotropic and psychotropic agents, antirheumatic, anti-inflammatory, antipyretic, etc., drugs.

OBJECTS: Ability to get basic information from a specialized text, work with key words, ability to construct a structure-sense diagram of the text, compression of the content, preparation of summaries and annotations, work with tables, schemes and plots.

ASSESSMENT: Current control, oral and written; semester work in written. Check of an unaided translation of a specialized text from English to Bulgarian.

GERMAN

ECTS CREDITS: 4

PRE-REQUISITES: Knowledge of the language acquired during the studies in the secondary school and rating in the respective diploma.

HORARIUM:

Seminars	Hours per week - 4	Weeks - 30
----------	--------------------	------------

SEMESTER: I and II

CONTENTS: General medical texts: systems and organs, and their functions.
Specialized texts: medicinal substances and their application; processes after the application of a drug; misuse of drugs; medical plants, allergies caused by drugs.

OBJECTS: Ability to get basic information from a specialized text, work with key words, ability to construct a structure-sense diagram of the text, compression of the content, preparation of summaries and annotations, work with tables, schemes and plots.

ASSESSMENT: Current control, oral and written; semester work in written. Check of an unaided translation of a specialized text from English to Bulgarian.

FRENCH

ECTS CREDITS: 4

PREREQUISITES: Knowledge of the language acquired during the studies in the secondary school and rating in the respective diploma.

HORARIUM:

Seminars	Hours per week - 4	Weeks - 30
----------	--------------------	------------

SEMESTER: I and II

CONTENTS:

Anatomy and physiology: apparatuses and systems of the human body

- motor, respiratory, digestive, excretory, reproductive systems
- neural system

Botany:

- organization of the vegetable kingdom
- vegetable organs, drugs
- principal constituents of vegetables
- galenic forms in phytotherapy
- plants of therapeutic usage

Pharmaceutical operations and forms

- drugs for oral, parenteral and cutaneous application
- the general classes of drugs

Grammar exercises; work on scientific texts, key words, detailed plan, taking notes, synthesis, summary, translation

OBJECTS: Ability to get basic information from a specialized text, work with key words, ability to construct a structure-sense diagram of the text, compression of the content, preparation of summaries and annotations, work with tables, schemes and plots.

ASSESSMENT: Current control, oral and written; semester work in written. Check of an unaided translation of a specialized text from English to Bulgarian.

RUSSIAN

ECTS CREDITS: 4

PRE-REQUISITES: Knowledge of the language acquired during the studies in the secondary school.

HORARIUM:

Seminars	Hours per week - 4	Weeks - 30
----------	--------------------	------------

SEMESTER: I and II

CONTENTS: General: anatomic and physiological characteristics of man; bones and articulations; skeleton of the human body.

General medical texts: organs of sense and organ of vision, preparation of foods and nutrition, cardio-vascular system, blood, immunity, endocrine glands.

Pharmaceutical texts: drug dosages, drug forms, pharmacology, manners of introduction of drugs in the organism - absorption, distribution of drugs, removal from the organism; side effects and toxic effects of medicinal substances; sulfonamide preparations, antibiotics, medical plants.

OBJECTS: Free usage of Russian when dealing with scientific medical and pharmaceutical literature, preparation of summaries and annotations of scientific texts.

ASSESSMENT: Continuous assessment, semester works in written, examination on 50 pages of an original pharmaceutical or medical scientific text for translation from Russian to Bulgarian.

BULGARIAN, First academic year

ECTS CREDITS: 4

PRE-REQUISITES: Training in a basic course of Bulgarian language and successfully passed examinations - oral and written

HORARIUM:

Seminars	Hours per week - 4	Weeks - 30
----------	--------------------	------------

SEMESTER: I and II

CONTENTS:

1. Texts from human anatomy and physiology, and biology, taught during the first academic year. Scientific-popular texts
 2. Exercises on:
 - basic phonetic rules in contemporary Bulgarian language;
 - morphology - peculiarities of the parts of speech, word-formation.
- Aspectuals. Temporal system;
- lexicology - medical and pharmaceutical terminology;
 - functional-semantic structures building up the medical texts;
 - syntactic of the simple sentence.

OBJECTS: Knowledge of the language necessary for the oral and written adequate communication in Bulgarian lingual medium - both in everyday life and in its academic aspects

ASSESSMENT: Current control, semester tests. examination

BULGARIAN, Second academic year

ECTS CREDITS: 4

PRE-REQUISITES: Training in a basic course of Bulgarian language and successfully passed examinations - oral and written

HORARIUM:

Seminars	Hours per week - 4	Weeks - 30
----------	--------------------	------------

SEMESTER: III and IV

CONTENTS:

1. Texts from human physiology, microbiology and botany, taught during the second academic year.
2. Exercises on:
 - syntax of the complex sentence;
 - structure of a scientific text, functional semantic constructions typical of the Bulgarian medical text;
 - lexicology - medical and pharmaceutical terminology;
 - stylistics - text editionThe teaching is pragmatically oriented.

OBJECTS: Knowledge of the language necessary for the oral and written adequate communication in Bulgarian lingual medium - both in everyday life and in its academic aspects

ASSESSMENT: Current control, semester tests, examination

HISTORY OF PHARMACY

ECTS CREDITS: 2

PRE-REQUISITES: None

HORARIUM: Lectures Hours per week - 2 Weeks - 15

SEMESTER: I

CONTENTS: Development of the pharmaceutical knowledge and practice related to the development of society and cultural history of nations. The development of Bulgarian pharmacy is considered in the context of world pharmacy.

OBJECTS: To provoke respect of the pharmaceutical profession by the presentation of the contribution of various countries to the development of world pharmacy as well as to elucidate the activities of famous old schools.

ASSESSMENT: Passing (on the “yes” or “no” basis) in written

INORGANIC CHEMISTRY

ECTS CREDITS: 11.5

PRE-REQUISITES: Successfully passed competitive examination on chemistry

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Seminars	Hours per week - 4	Weeks - 7
Practicals	Hours per week - 3,4	Weeks - 28

SEMESTER: I and II

CONTENTS: The most important problems of the general theory as well as the systematic material of inorganic chemistry are included in the lecturing course. Particular attention is given to the macro- and microbiogenic elements and their substances which are of decisive importance for the existence and functioning of biosystems. The laboratory exercises are preceded by a course of stoichiometric calculations. The practical training includes the solution of theoretical problems.

OBJECTS: Training in the basic manipulations in a chemical laboratory. Creation of a basis for the future education in all other chemical subjects.

ASSESSMENT: Practical examination, examination in written, oral examination

PHYSIOLOGY WITH BASICS OF ANATOMY

ECTS CREDITS: 11

PRE-REQUISITES:

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Practicals	Hours per week - 2	Weeks - 30

SEMESTER: II and III

CONTENTS: Structure and function of cells, organs and systems building up the human organism. Mechanism, regulation and adaptation of physiological functions. Physiological methods for the investigation with applications in clinical and experimental practice.

OBJECTS: Understanding of the mechanism of action of medicinal substances

ASSESSMENT: Oral and written examination at the end of the third semester.

COMPUTER TECHNOLOGIES

ECTS CREDITS: 2

PRE-REQUISITES: None

HORARIUM: Practicals Hours per week - 2 Weeks - 15

SEMESTER: III

CONTENTS: Lay-out and principle of action of contemporary personal computers and related operation systems; contemporary text-processing, graphical, tabular, editing and communicative possibilities of computer systems - practical usage of the basic Internet and e-mail services.

OBJECTS: Gaining of knowledge on the lay-out and principle of action of contemporary personal computers and related operation systems; development of capabilities for the practical usage of contemporary computer systems and information technologies.

ASSESSMENT: Passing (on the “yes” or “no” basis) in two stages - practical and theoretical

ANALYTICAL CHEMISTRY

ECTS CREDITS: 15

PRE-REQUISITES: Successfully passed examination on Inorganic Chemistry

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Practicals	Hours per week - 6	Weeks - 30

SEMESTER: III and IV

CONTENTS: Qualitative analysis of cations and anions. Basic parts in the quantitative titrimetric analysis: acid-base equilibria, slightly soluble substances, complexometric equilibria, redox equilibria. Instrumental methods of analysis - potentiometry, spectrophotometry, chromatography (thin-layer chromatography and high-efficiency liquid chromatography).

OBJECTS: Gaining knowledge on the basic principles and methods of chemical analysis

ASSESSMENT: Written and oral examination

ORGANIC CHEMISTRY

ECTS CREDITS: 17

PRE-REQUISITES: Successfully passed examinations on Physics, Mathematics, as well as General and Inorganic Chemistry

HORARIUM: Lectures	Hours per week – 4/2	Weeks - 30
Seminars	Hours per week - 1	Weeks - 30
Practicals	Hours per week - 5	Weeks - 30

SEMESTER: III - lectures, 4 h + seminars, 6 h + exercises
IV - lectures, 2 h + seminars, 6 h + exercises

CONTENTS: Nomenclature of organic compounds; structure of substances from the quantum-mechanical point of view; basics of stereochemistry; relationship between structure and reactivity; mechanisms of organic reactions; spectral methods of analysis (infrared spectroscopy, nuclear magnetic resonance, mass spectroscopy, electron spectroscopy); fatty and aromatic, saturated and unsaturated hydrocarbons; halogen derivatives, hydroxyl derivatives, aldehydes and ketones, carboxylic acids and their functional derivatives; fatty and aromatic amines; heterocyclic compounds with three- to six-atom cycles and one or two heteroatoms - oxygen, nitrogen and sulfur; purines and pteridines; organic compounds with biological activity; medicinal substances.

OBJECTS: Fundamental knowledge of organic chemistry necessary for the training in pharmaceutical chemistry, pharmacognosy, biochemistry, technology of drug forms, chemical-pharmaceutical technology and other specialized subjects

ASSESSMENT: Written examination on three themes and a problem on multistage synthesis in the frames of four hours; each theme and the problem have a relative assessment value of 25%. Marks from 2 (bad) to 6 (excellent).

PHYSICAL CHEMISTRY

ECTS CREDITS: 10

PRE-REQUISITES: Successfully passed examinations on Pure Mathematics, Physics, Inorganic Chemistry

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Practicals	Hours per week - 4	Weeks - 30

SEMESTER: IV and V

CONTENTS: Thermodynamics of homogeneous and heterogeneous systems; electrochemistry, colloid chemistry; chemical kinetics; pharmacokinetics; structure of substances.

OBJECTS: Knowledge of the approaches to the study of the state of the systems and the processes occurring in these systems, as well as their application in the pharmaceutical science and practice.

ASSESSMENT: Written and oral examination

PHARMACEUTICAL BOTANY

ECTS CREDITS: 9

PRE-REQUISITES: none

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Seminars	Hours per week - 1	Weeks - 15
Practicals	Hours per week - 3	Weeks - 25

SEMESTER: IV and V

CONTENTS: Pharmaceutical botany includes anatomy of plants (cytology, histology, organography), morphology, physiology of plants, phytogeography and ecology. The natural resources of medical plants, the methods of their effective use, protection and reproduction are studied together with their importance as sources of biologically active substances.

OBJECTS: Knowledge, from the point of view of botany, of the medical plants in order to serve as a basis for the study of pharmacognosy.

ASSESSMENT: Current control, practical and theoretical examination

TECHNICAL DRAWING

ECTS CREDITS: 1

PRE-REQUISITES: Stereometry studied in the secondary school

HORARIUM:

Practicals

Hours per week - 2

Weeks - 15

SEMESTER: V

CONTENTS: Students get familiar with an international technical language as well as with its rules and application, adapted to the needs of students in pharmacy. During the practical exercises, elements of the construction of heat-exchangers used in pharmaceutical industry are drawn and sized. Computerized approaches are also taught.

OBJECTS: Knowledge of the rules of the Bulgarian State Standard and practical skills in technical drawing.

ASSESSMENT: continuous assessment

PHARMACEUTICAL CHEMISTRY

ECTS CREDITS: 14

PRE-REQUISITES: Successfully passed examination on Organic Chemistry

HORARIUM: Lectures	Hours per week - 3	Weeks - 30
Seminars	Hours per week - 3/2	Weeks - 30
Practicals	Hours per week - 2	Weeks - 30

SEMESTER: V and VI

CONTENTS: Classical and modern medicinal substances are studied on the basis of a combined pharmacotherapeutic and chemical classification. Each part includes characteristics, structure, chemical denomination, properties, methods of preparation, biotransformation, relationship between structure and activity. Possibilities are considered of alteration of properties, toxicity, etc.

OBJECTS: In-depth knowledge of the items listed above

ASSESSMENT: Current control and written and oral examination

BIOCHEMISTRY

ECTS CREDITS: 4

PRE-REQUISITES: Successfully passed examinations on Inorganic Chemistry, Analytical Chemistry and Organic Chemistry

HORARIUM: Lectures	Hours per week - 3	Weeks - 15
Seminars	Hours per week - 2	Weeks - 2
Practicals	Hours per week - 2	Weeks - 13

SEMESTER: V

CONTENTS: Structure and function of proteins and nucleic acids. Application of knowledge on polymers in the clinical practice. Enzymes. Clinical significance of enzymes. Antimetabolites. Bioenergetics. Citric acid cycle. Metabolism of carbohydrates. Metabolism of lipids. Metabolism of amino acids. Metabolism of nucleotides. Enzymopathies, related to metabolism. Integration and interrelations between metabolism of carbohydrates, lipids, amino acids and nucleotides. Metabolism of DNA, RNA and proteins. Carcinogenesis. Regulation of metabolism. Signal transduction. Hormones. Diabetes Mellitus. Biochemistry and functions of liver. Degradation and synthesis of porphyrins. Jaundices. Biochemistry of nutrition. Computer presentations are used at each lecture - Power Point illustrations and animations (molecular graphics) and other interactive programs.

This course is being now developed also for distance learning, appropriate for under- and post-graduates. The Web-based version of the course consists of lectures, interactive tests and simulations of clinical cases. Part of it is in the Internet: <http://www.medfac.acad.bg/c&b/biochimia/content.html> or <http://biochemistry.dir.bg>, or <http://sites.portal.ngorc.net/biochemistry/egb/content.html>

OBJECTIS: As biochemistry is the study of the molecular basis of life, the goals of the unit are:

- (i) to provide theoretical knowledge on the content, structure and functions of the cell components, on the chemical reactions and processes occurring in cells and their regulation, and to explain their significance for organisms in norm and in disease, giving in each category examples about the application of theory in the clinical practice;
 - (ii) to pass from passive teaching to active regular or distance problem-based learning via application of theory for solving interactive Web-based computer-simulated cases and to provide self-assessment of knowledge via tests;
- to assure practical instruction and training in basic laboratory biochemical methods and professional teamwork.

ASSESSMENT: Oral and written examinations

CLINICAL CHEMISTRY

ECTS CREDITS: 3

PRE-REQUISITES:

HORARIUM: Lectures	Hours per week - 1	Weeks - 15
Practicals	Hours per week - 3	Weeks - 15

SEMESTER: VI

CONTENTS: Theoretical aspects of clinical chemistry in the following sections - general problems concerning the materials used for investigation, types of errors in laboratory diagnostics, reference limits and values, analytical reliability of the methods, assurance of quality in clinical laboratories; basic knowledge on the methods used for the study of electrolytes, oligoelements, indices of the alkali-acidic state of blood, carbohydrates, proteins, enzymes, non-protein nitrogen-containing substances, lipids, hormones, drugs and drug monitoring. During the exercises, the students get skilled in the clinical chemistry practice, the interpretation of the results and their clinical significance.

OBJECTS: Skills for work in clinical laboratories as specialists in clinical chemistry
ASSESSMENT: Oral examination

PHARMACEUTICAL TECHNOLOGY AND BIOPHARMACY, Part 1

ECTS CREDITS: 13

PRE-REQUISITES:

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Practicals	Hours per week - 5	Weeks - 30

SEMESTER: V and VI

CONTENTS: Conventional drug dosage forms - pulveres, liquida, unguenta, suppositoria, etc., pharmaceutical operations and pharmacopoeal characteristics.

OBJECTS: Providing the basic knowledge and practical skills in the preparation and characterization of conventional drug dosage forms.

ASSESSMENT: Tests, practical exams, written and oral examinations.

MEDICAL TECHNIQUE AND INSTRUMENTS

ECTS CREDITS: 2

PRE-REQUISITES:

HORARIUM:

Practicals	Hours per week - 3	Weeks - 15
------------	--------------------	------------

SEMESTER: VI

CONTENTS: The facilities used in medical practice for conducting diagnostic, curative, etc., manipulation are studied. The nomenclature, type and function of medical appliances, apparatuses and instruments, their structural characteristics, the respective manner and conditions of operation, the changes that could occur upon their use and storage, the quality requirements they should suit, the methods of testing their qualities and fitness, the manner and rules for their approval are discussed.

OBJECTS: To provide information of the nomenclature, the methods of testing the quality and fitness of medical facilities, the regulations for their packing, transportation and storage.

ASSESSMENT: Colloquium, passing (on the “yes” or “no” basis)

PHARMACOGNOSY, Part 1

ECTS CREDITS: 13

PRE-REQUISITES: Successfully passed examinations on Botany and Organic Chemistry

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Seminars	Hours per week - 5	Weeks - 1
Practicals	Hours per week - 5	Weeks - 29

SEMESTER: VI and VII

CONTENTS: The curative raw materials of animal and vegetal origin are studied using physical, chemical, physicochemical and biological methods.

OBJECTS: Identification, elucidation of the qualitative and quantitative content of biologically active compounds in drugs.

ASSESSMENT: Current control, practical and theoretical examinations.

PHARMACOLOGY

ECTS CREDITS: 11

PREREQUISITES: Successfully passed majority of the courses dealing with medical and biological subjects.

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week - 4	Weeks - 7 or 8 weeks
Practicals	Hours per week - 3	Weeks - 15

SEMESTER: VI and VII

CONTENTS: During the sixth semester, the basic concepts of general pharmacology, necessary for the accumulation of fundamental information concerning the medicinal effect are studied. During this semester, the study of the special pharmacology, in its parts on the central and autonomous neural systems is also starting. During the seventh semester, the drugs affecting the cardio-vascular system, the cell-mediated systems, the endocrine system are studied. Furthermore, the course includes the study of the microbiological, pharmacodynamic, pharmacokinetic and healing aspects of the clinically applied antiinfectious drugs; the principles of chemotherapy for the selective toxicity with respect to bacterial, viral and fungal infectious causes are considered together with the chemotherapy of malignant tumors and chemoblastoses.

OBJECTS: On the basis of the already acquired knowledge on the essence of the physiological and pathophysiological processes in the organism, to focus on the medicinal effects of the various pharmacological remedies, with good knowledge of their pharmacodynamics, pharmacokinetics, therapeutic indications and undesired reactions.

ASSESSMENT: Oral and written examination; practical examination based on tests; colloquia during the exercises; preparation of a thesis during the seminars

CELLULAR AND MOLECULAR PHARMACOLOGY

ECTS CREDITS:

PRE-REQUISITES: Successfully passed majority of the courses dealing with medical and biological subjects and the examinations on Pharmacology and Toxicology

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Practicals	Hours per week - 4	Weeks - 15

SEMESTER: IX

CONTENTS: The targets and the molecular biology of receptors, the ionic channels and enzymatic systems, the process of signal transduction, the mechanisms of apoptosis and its importance for the tumors and vascular processes, the selective expression (inhibition of genes, coding proteins participating in the drug activity), free-radical processes and possibilities of pharmacological control with antioxidants and other chemoprotectors, the mechanisms of the neurodegenerative processes and neuroprotection, the protein drugs and gene therapy are studied. The experimental practice is dedicated to the mastering of the methods for experimental assessment of drugs.

OBJECTS: To provide information on the cells and the molecular mechanisms of the drug activity in two directions: identification and characterization of novel and known remedies and pharmacological control of the pathologic process by knowing the biomolecules - targets.

ASSESSMENT: Written and oral examination, colloquia during the exercises.

BASICS OF CLINICAL MEDICINE AND PHARMACOTHERAPY

ECTS CREDITS: 4

PRE-REQUISITES: Successfully passed majority of the courses dealing with medical and biological subjects and the examinations on Pharmacology and Toxicology

HORARIUM: Lectures	Hours per week - 3	Weeks - 15
Practicals	Hours per week - 1	Weeks - 15

SEMESTER: VIII and IX

CONTENTS: The clinics and medical treatment of the following syndromes and diseases are considered: the infectious-inflammatory syndrome with lung localization, incl. bronchial asthma as well as the bronchospastic syndrome; the syndrome of cardiac insufficiency, the thromboembolic syndrome and dislipidemias, hypertonia; the syndrome of cardiac inhemia, cardiac arrhythmia; hyperacidic syndrome; noninfectious-inflammatory syndrome; malignant tumors and chemoblastoses; hyperglycemia and other endocrine disorders; dermatologic diseases; cerebral-vascular disease; undesired reactions caused by prolonged pharmacotherapy are studied.

OBJECTS: To provide information on the clinics of various syndromes and diseases of internal medicine, on the mechanisms of the pathologic process and on the pharmacotherapeutical approaches to their effective healing.

ASSESSMENT: Written and oral examinations, colloquia during the practicals.

TOXICOLOGY

ECTS CREDITS: 4

PREREQUISITES: Basic knowledge in the fields of the medicobiological and pharmaceutical subjects, the respective examinations being successfully passed.

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week - 4	Weeks - 2
Practicals	Hours per week - 4	Weeks - 13

SEMESTER: VIII

CONTENTS:

(a) General toxicology - basic modern principles of medicinal toxicology, toxicokinetics and toxicodynamics, mechanisms of toxic action, undesired effects of drugs, drug safety - monitoring of the undesired effects of drugs, genotoxic, mutagenic, cancerogenic, teratogenic, immunotoxic action, biotransformation - enzyme mechanisms, cytochrome P450, factors affecting toxicity (endogenic and exogenic), toxicological aspects of medicinal interactions, misuse of drugs, drug dependence, toxicomanias.

(b) Special toxicology - toxicological characterization of basic pharmacological groups, mechanisms of the medicinal injuries of organs and systems, injuries by nonmedicinal agents - alcohol and nicotine, interaction with drugs, toxic substances from the environment: pesticides, heavy metals, organic solvents, industrial and domestic gases, etc., - effect on the biotransformation processes, toxicologic characteristics of medical plants and nutritive additives, acute medicinal intoxications - modern antidotes, detoxicants.

OBJECTS: On the basis of the already acquired knowledge in the field of medicinal toxicology, to provide a possibility of effective participation in the process of optimization and safety of medicinal therapy as well as of prevention of drug misuse.

ASSESSMENT: Oral and written examination, colloquia during the practicals, preparation of a thesis during the seminars, current control by tests.

DRUG METABOLISM AND DRUG TOXICITY

ECTS CREDITS: 7.5 (90 hours)

PRE-REQUISITES: Basic knowledge in the fields of the medicobiological subjects, the respective examinations (Pharmacology and Toxicology) being successfully passed.

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
--------------------	--------------------	------------

Practicals	Hours per week - 4	Weeks - 15
------------	--------------------	------------

SEMESTER: IX

CONTENTS: The course includes biotransformation processes, cytochrome P450 system - molecular mechanisms, hepatal and extrahepatal drug metabolism, toxic metabolites, detoxication processes, enzymatic induction and inhibition, medicinal interactions, factors affecting the drug metabolism, genetic polymorphism in drug metabolism, methods of assessment of the drug metabolism in the experimental toxicology and in humans, correlation of the experiments in vitro and in vivo.

OBJECTS: In-depth and specialized knowledge in the field of drug metabolism and its importance for the toxicological aspects of medicinal therapy.

ASSESSMENT: Tests, colloquium, written and oral examinations.

DRUG DEPENDENCE AND NARCOMANIAS

ECTS CREDITS: 7.5 (90 hours)

PRE-REQUISITES: Basic knowledge in the fields of the medico-biological subjects, the respective examinations (Pharmacology and Toxicology) being successfully passed.

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week -	Weeks -
Practicals	Hours per week - 4	Weeks - 15

SEMESTER: IX

CONTENTS: Drug misuse, tolerance, dependence, abstinence - mechanisms, drugs causing dependence, misuse of nonmedicinal agents (alcohol, nicotine, etc.). Specific characteristics of the problem in Bulgaria, medicinal substituting therapy, legal and moral aspects of narcomanias - the role of the pharmacist.

OBJECTS: In-depth and specialized knowledge in the field of the problems of drug dependence and narcomanias for the active participation of the pharmacist in the prevention of the development of dependencies and narcomanias.

ASSESSMENT: Tests, colloquium, written and oral examination

HYGIENE AND ECOLOGY

ECTS CREDITS: 3

PRE-REQUISITES: Completed education in Organic Chemistry, Inorganic Chemistry, Quantitative Analysis, Anatomy, Physiology, Pathoanatomy, Pathophysiology, Biochemistry and Clinical Chemistry, Clinical Medicine and Pharmacotherapy

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week - 1	Weeks - 15

SEMESTER: VII

CONTENTS: Basic ecological problems of pollution, protection and control of atmospheric air, waters and soils; effect on human health; physiology of nutrition; biological and chemical safety of foods; nutritional diseases; hygienic requirements to the design and exploitation of pharmacies; safety in the production of medicinal substances; physical, chemical and biological factors of the working environment and related professional diseases with emphasize on the specific pathology in the cases of pharmacy personnel and workers in the chemical-pharmaceutical industry; infection and epidemic processes, antiepidemic measures, ecological and antiepidemiological regularities of the infections of the respiratory system, intestinal, transmittive and coating infections.

OBJECTS: Possibilities of participation in the system for the monitoring of environment, incl. biomonitoring; sanitary control in pharmacies; participation in the development of prophylactic programs, in antiepidemic activities.

ASSESSMENT: Test and theoretical examination (oral and written).

GENERAL PATHOLOGY

ECTS CREDITS: 2

PRE-REQUISITES: Successfully passed examinations on Anatomy and Physiology

HORARIUM: Lectures	Hours per week - 14	Weeks - 7
Seminars	Hours per week - 14	Weeks - 7

SEMESTER: VII

CONTENTS: Processes of general pathology: necrosis and atrophy; disorders in the metabolism of tissues and cells; disorders in the circulation; forms of inflammation; regenerative growth and tumors; disorders in the development of the organism (teratology); drug injuries (drug disease), etc.

OBJECTS: Basic theoretical knowledge in the field of medicine in order to facilitate the understanding of other teaching subjects

ASSESSMENT: Passing (on the "yes" or "no" basis).

PROCESSES AND EQUIPMENTS IN PHARMACEUTICAL INDUSTRY

ECTS CREDITS: 2

PRE-REQUISITES: Technical Drawing

HORARIUM: Lectures	Hours per week - 3	Weeks - 15
Practicals	Hours per week - 3	Weeks - 15

SEMESTER: VII

CONTENTS: The course is intended to provide information to the students of the industrial profile with the essence and regularities of the basic processes in pharmaceutical industry and the apparatuses where these processes are conducted. Methods of investigation and modelling of these processes and apparatuses are studied; by mastering of the mathematical description of the latter, to provide possibilities for calculation of the facilities and for their proper exploitation during the technological processes. Students become capable of determining the basic parameters governing the processes, of improving the operation of the installations, of selecting the most appropriate facilities.

OBJECTS: To study the basic regularities of hydraulics, transportation of liquids and gases, stirring of liquid media, separation of heterogeneous systems, heat-exchange and mass-exchange processes the combination of which makes possible the realization of a given technology in pharmaceutical industry.

ASSESSMENT: Examination in written

TECHNOLOGY OF COSMETIC PREPARATIONS

ECTS CREDITS: 2

PRE-REQUISITES: Successfully passed examinations on Technology of Drugs, Parts 1 and 2

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Practicals	Hours per week - 4	Weeks - 15

SEMESTER: VII

CONTENTS: Taking into account the chemical, technological and medico-biological education of the students, this course aims at the broadening of their knowledge and skills in the field of medical cosmetic preparations - raw materials, basic formulations, technology, control, selection and application, maintenance programs for different types of skin

OBJECTS: Broadening of the knowledge and skills in the field of medical cosmetic preparations

ASSESSMENT: Examination in written

PHARMACEUTICAL TECHNOLOGY AND BIOPHARMACY, Part 2

ECTS CREDITS: 12

PRE-REQUISITES: Successfully passed examination on Pharmaceutical Technology and Biopharmacy, Part 1

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Seminars	Hours per week - 2	Weeks - 7
Practicals	Hours per week - 5	Weeks - 30

SEMESTER: VII and VIII

CONTENTS: Classical and modern approaches to the development and characterization of drug dosage forms: solid - (granules, capsules, tablets), sterile - (Parenteralia, Ophthalmica) and phytotherapeutica. Modern requirements for effective and safe dosage forms.

OBJECTS: Basic theoretical and practical knowledge of the formulation, production and control of dosage forms.

ASSESSMENT: Tests, practical examination, written and oral examinations.

PHARMECEUTICAL ANALYSIS

ECTS CREDITS: 12

PRE-REQUISITES: Successfully passed examinations on Analytical Chemistry

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Practicals	Hours per week – 6/5	Weeks - 30

SEMESTER: II

CONTENTS: Possibilities of functional analysis and instrumental methods of analysis (spectroscopy in the UV, visible and IR spectral regions, chromatography, etc.) for the identification and assessment of the amount and purity of the medicinal substances are considered.

OBJECTS: To assure knowledge and skills in the quality control of medicinal substances.

ASSESSMENT: Written and oral examinations

ORGANIZATION AND ECONOMY OF PHARMACY

ECTS CREDITS: 8

PRE-REQUISITES: Successfully completed seventh semester; passed examinations on basic pharmaceutical subjects

HORARIUM: General Profile

Lectures	Hours per week - 2	Weeks - 20
----------	--------------------	------------

Practicals	Hours per week - 3	Weeks - 20
------------	--------------------	------------

Industrial Profile

Lectures	Hours per week - 2	Weeks - 10
----------	--------------------	------------

Practicals	Hours per week - 3	Weeks - 10
------------	--------------------	------------

SEMESTER: General Profile VII and VIII, Industrial Profile VII

CONTENTS: Possibility of harmonization of the problems of pharmaceutical legislation, management and marketing, and the good pharmaceutical practice in Bulgaria with those of the European countries.

OBJECTS: To create an overall concept on the stages from the investigation of drugs to their effective application to patients.

ASSESSMENT: Practical examination and examination in written.

MEDICAL GENETICS

ECTS CREDITS: 2

PRE-REQUISITES:

HORARIUM: Lectures	Hours per week - 1	Weeks - 15
Seminars	Hours per week - 1	Weeks - 15

SEMESTER: VIII

CONTENTS: The etiology of inherited diseases, chromosome diseases and differential diagnosis with the teratogenic effects of drugs and other exogenous factors in the etiology and pathogenesis of innate malformations are considered. Basic classes molecular diseases with emphasis on the pharmacogenetic defects, enzymopathies, defects in the connective tissue and the role of genetic factors in the oncogenesis as well as approaches to genetic prophylaxis and therapy, and principles of gene therapy are also included.

OBJECTS: Basic knowledge of the problems of inherited pathology.

ASSESSMENT: Passing (on the "yes" or "no" basis).

CHEMICAL-PHARMACEUTICAL TECHNOLOGY

ECTS CREDITS: 2

PRE-REQUISITES: Successfully passed examinations on Organic Chemistry and Pharmaceutical Chemistry

HORARIUM: Lectures	Hours per week - 3	Weeks - 15
Practicals	Hours per week - 6	Weeks - 15

SEMESTER: VIII

CONTENTS: Details on the synthesis and the industrial production of basic groups of medicinal substances, technologies developed by Bulgarian researchers related to the production of medicinal substances and drugs applied to patients suffering diseases of social significance, the strict quality control of the raw materials and products at every stage of the production cycle in this branch of technology, the possible side effects and the complete elimination of by-products and impurities are considered. Criteria for the production of medicinal substances of pharmacopoeial purity and the ecological aspects of the technologies are also included.

OBJECTS: To assure knowledge on the organization and equipment of industrial units for the production of drug substances, on the safety principles, on the behaviour in cases of industrial accidents, on the specialized clothes for work with highly toxic substances.

ASSESSMENT: Written and oral examination.

PHARMACEUTICAL TECHNOLOGY AND BIOPHARMACY, Part 3

ECTS CREDITS: 7

PRE-REQUISITES: Successfully passed examinations on Pharmaceutical Technology and Biopharmacy, Parts 1 and 2

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Practicals	Hours per week - 6	Weeks - 15

SEMESTER: IX

CONTENTS: Drug delivery systems - development and characterization; stability and stabilization of drugs, methods of assessment of the drug stability and of prediction of the drug shelf-life. Methods for the biopharmaceutical study of dosage forms; in vitro release and dissolution - mathematical evaluation and modes of presentation of the results. Pharmaceutical and bio-equivalence of drug preparations.

OBJECTS: To provide knowledge on modern drug delivery systems; basic methods for the evaluation of drug stability and stabilization, biopharmaceutical characterization of drug dosage forms.

ASSESSMENT: Tests, practical examinations, written and oral examinations.

BROMATOLOGY

ECTS CREDITS: 4

PRE-REQUISITES: Successfully passed examinations on Pharmaceutical Chemistry and Analytical Chemistry

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Practicals	Hours per week - 2	Weeks - 15

SEMESTER: IX

CONTENTS: Composition of foods - proteins, fats, carbohydrates, vitamins, mineral salts, nutrient additives; drug-food interactions on the level of resorption, distribution, metabolism, excretion; food-poisonings of chemical and microbiological origins.

OBJECTS: To assure knowledge of the methods of food analysis and of the drug-food interactions.

ASSESSMENT: Colloquium, written and oral examinations.

MODERN REQUIREMENTS TO THE PRODUCTION OF DRUGS

ECTS CREDITS: 5

PRE-REQUISITES: Successfully passed examinations on Pharmaceutical Technology and Biopharmacy, Pharmaceutical Chemistry and Analysis

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week - 4	Weeks - 15

SEMESTER: IX

CONTENTS: Scientific principles and international requirements at every stage of the production of a drug preparation; consideration of the good manufacturing practice (GMP) as a part of the global strategy for the creation of drug preparations meeting the international standards concerning the quality, safety and effectiveness, i.e., the so-called quality assurance (QA). The international and world criteria for the free movement of pharmaceutical products in the world market are emphasized.

OBJECTS: Knowledge of the modern strategies in providing quality and safety at every stage from the creation of a drug to its production and application.

ASSESSMENT: Examination in written.

BIOTECHNOLOGY OF DRUG SUBSTANCES

ECTS CREDITS: 2

PRE-REQUISITES: Successfully completed fourth academic year

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week -	Weeks -
Practicals	Hours per week - 4	Weeks - 15

SEMESTER: IX

CONTENTS: The Biotechnology of Medicinal Substances as an interdisciplinary science, dealing with chemistry, technology, microbiology, biochemistry, pharmacology, etc. Production of a wide variety of medicinal substances, such as antibiotics, corticosteroids, vitamins, etc. Biotechnology as a basic branch of pharmaceutical science and production.

OBJECTS: Knowledge of the basic theoretical requirements and practical skills related to this teaching subject.

ASSESSMENT: Examination in written

PHARMACOGNOSY, Part 2

ECTS CREDITS: 5

PRE-REQUISITES: Successfully passed examination on Pharmacognosy, Part 1

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week - 4	Weeks - 3
Practicals	Hours per week - 4	Weeks - 12

SEMESTER: VIII

CONTENTS: Extraction of drugs from freely growing and cultivated medicinal plants - advantages and drawbacks. Standardization of drugs and standard documents. Methods of isolation, identification, qualitative and quantitative analysis of biologically active substances of vegetal origin. Types of phytopreparations and stages of their manufacturing. Phytopreparations from various groups naturally occurring substances. Chemotaxonomy and significance for pharmacy.

OBJECTS: On the basis of the theoretical knowledge acquired from Pharmacognosy, Part 1, to provide the students with practical skills in this respect.

ASSESSMENT: Examination oral and written

PHYSICS AND BIOPHYSICS

ECTS CREDITS: 10

PRE-REQUISITES: Successfully passed examination on Higher Mathematics is recommended

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Seminars	Hours per week - 1	Weeks - 30
Practicals	Hours per week - 2	Weeks - 30

SEMESTER: I and II

CONTENTS: Structure and properties of liquids and solids. Optics - basics of refractometry, dioptrometry, photocolometry, spectrophotometry, nephelometry, polarimetry, microscopy. Spectroscopy - atomic, molecular, X-ray, mass, NMR, EPR, Moessbauer. Ionization radiations - X-rays, radioactivity, dosimetry.

Rheology of simple liquids and heterogeneous systems, haemorheology. Thermodynamics and Biothermodynamics. Biological and man-made membranes - functions, types, chemical composition, structure. Free-radical lipid peroxidation in biomembranes. Transport of substances through porous and semipermeable membranes, facilitated diffusion, active transport. Electrical properties of cells and tissues - biopotentials: static and dynamic, surface electrical charge, electrical conductivity.

OBJECTS: Knowledge necessary for the study of Analytical Chemistry, Physical Chemistry, Organic Chemistry, Pharmaceutical Chemistry, Technology of Medicinal Substances, Processes and Apparatuses, Chemical-Pharmaceutical Technology. Skills acquired by laboratory training.

ASSESSMENT: Examination in written with oral explanations

APPLIED MATHEMATICS

ECTS CREDITS: 3

PRE-REQUISITES: Successfully passed examination on Pure Mathematics

HORARIUM: Lectures	Hours per week - 1	Weeks - 15
Practicals	Hours per week - 2	Weeks - 15

SEMESTER: II

CONTENTS: Elements of combinatorics and classical probability theory - random experiments and events; statistical, classical and geometrical probability, basic formulae for the probability of a random event; sequences of independent experiments; random quantities and their numerical characteristics; theorem of Chebishev, Bernouli law for big numbers and theorem of Liapunov; elements of the mathematical statistics; elements of the mathematical modelling.

OBJECTS: Knowledge of the basic sections of the probability theory, mathematical statistics and mathematical modelling that are necessary for the understanding of the quantitative methods and models of Physical Chemistry, Biochemistry, Biology, Medicine, Pharmacology and for the unaided solution of some of the problems often encountered in pharmaceutical research.

ASSESSMENT: Passing (on the "yes" or "no" basis) in two stages - practical and theoretical

SYNTHESIS OF BIOLOGICALLY ACTIVE SUBSTANCES

ECTS CREDITS: 2

PRE-REQUISITES: Successfully completed ninth semester

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Practicals	Hours per week - 4	Weeks - 15

SEMESTER: X

CONTENTS: Methods of synthesis, isolation and purification of ^{131}I (iodine) and ^{19}F (fluorine) labelled substances for the diagnostics of cardio-vascular diseases and tumors. Methods of synthesis of antitumor preparations of the alkylating type on the basis of bis-(2-chloroethyl)amine and aziridine. Last but not least, some scientific investigations carried out at the Faculty of Pharmacy and related to the development of methods for the synthesis of medicinal substances are discussed.

OBJECTS: Knowledge of modern approaches to the synthesis of medicinal substances for the diagnostics and treatment of diseases that are of social significance world-wide.

ASSESSMENT: Written and oral examinations.

STATISTICAL METHODS IN PHARMACY

ECTS CREDITS: 3

PRE-REQUISITES:

HORARIUM: Lectures	Hours per week - 1	Weeks - 15
Practicals	Hours per week - 3	Weeks - 15

SEMESTER: IX

CONTENTS: Modern statistical methods - primary data processing (descriptive statistics), correlation analysis, regression analysis, dispersion analysis, analysis of time-dependent series.

OBJECTS: Knowledge on the basic sections of mathematical statistics, necessary for the unaided solution of the problems often encountered in pharmaceutical research.

ASSESSMENT: Examination in two stages: practical and theoretical.

SYNTHESIS OF BIOLOGICALLY ACTIVE SUBSTANCES

ECTS CREDITS: 2

PRE-REQUISITES: Successfully completed ninth semester with passed examinations on Pharmaceutical Technology and Biopharmacy, Parts 1 and 2, Pharmaceutical Chemistry, Analytical Chemistry, Pharmacology, Pharmacognosy

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week - 4	Weeks - 10
Practicals	Hours per week - 4	Weeks - 5

SEMESTER: X

CONTENTS: Modern trends in the production of tablets, capsules and tablets with directed action. Required facilities, equipment and raw materials, design of technological lines with capacity from 50 to 500 million tablets per year; equipment of laboratories and small enterprises for their production. Control and some peculiarities of the GMP (good manufacturing practice) in the production of solid drug dosage forms. Marketing peculiarities in the study of the market demands.

OBJECTS: Training of specialists for the establishment of small enterprises as well as for participation in larger pharmaceutical companies.

ASSESSMENT: Oral and written

DRUG USAGE AND PHARMACOECONOMY

ECTS CREDITS:

PRE-REQUISITES: Completed VIII semester, successfully passed examination on Social Pharmacy, Parts 1 and 2, interests in the economic aspects of pharmaceutical practice

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week - 2	Weeks - 1
Practicals	Hours per week - 4	Weeks - 14

SEMESTER: IX

CONTENTS: The lecturing course is divided into two modules. The first one deals with drug usage and the respective effects of various factors, basic methods for the assessment of the usage, common measuring units for the assessment of its characteristics as well as methods for the prediction of its changes, requirements for the rationalization of drug usage and influence of the health insurance systems on the formation and preservation of the level of expenses for drugs.

In the second module, the essence of pharmacoeconomy, basic concepts and methods, existing scientific approaches and application of the separate methods for the assessment of various aspects of drug therapy using indices characterizing the cost, effectiveness, benefit and profit are discussed. Two generalizing themes representing the relationship between the assessment of drug usage and pharmacoeconomy and their significance for the establishment of the drug policy are also included.

OBJECTS: Knowledge of the basic concepts, methods, computation techniques and means applied in the assessment of the drug usage and the pharmacoeconomical evaluation of the costs and the results of the drug therapy.

ASSESSMENT: Written report on a practical problem in the field, written examination with oral discussion

PHARMACEUTICAL MARKETING MANAGEMENT

ECTS CREDITS: 4

PRE-REQUISITES: Successfully passed examination on Organization and Economy of Pharmaceutical Production and Pharmacy Distributor Practice

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Practicals	Hours per week - 4	Weeks - 15

SEMESTER: IX

CONTENTS: Specificity of pharmaceutical marketing and marketing management in pharmaceutical business.

OBJECTS: Training of Master Pharmacists for work in pharmaceutical companies as managers, medicinal representative, foreign trade activities, etc.

ASSESSMENT: Examination

INTRODUCTION TO PHARMACOEPIDEMIOLOGY

ECTS CREDITS: 4

PRE-REQUISITES: Successfully completed VIII semester, successfully passed examination on Organization and Economy of Pharmaceutical Production and Pharmacy Distributor Practice, interests in the decrease of risks upon the use of drug preparations by patients

HORARIUM: Lectures	Hours per week - 2	Weeks - 15
Seminars	Hours per week - 4	Weeks - 3
Practicals	Hours per week - 4	Weeks - 13

SEMESTER: IX

CONTENTS: Methodology and epidemiologic methods with emphasis on the decrease of the risks upon the use of drug preparations by patients.

OBJECTS: Knowledge of the essence and the contribution of this new teaching subject to the effective and safe use of drugs.

ASSESSMENT: Written report on a preliminarily stated problem - 20%, written examination and oral discussion - 70%, participation in seminars - 10%

MICROBIOLOGY

ECTS CREDITS: 8

PREREQUISITES:

HORARIUM: Lectures	Hours per week - 2	Weeks - 30
Seminars	Hours per week - 2	Weeks - 4
Exercises	Hours per week - 2	Weeks - 30

SEMESTERS: III and IV

CONTENTS: General microbiology, infection and immunity, special microbiology

OBJECTS: Knowledge of the morphology, structure and physiology of microorganisms causing contagious diseases; the principles and means of the treatment of contagious diseases using chemotherapy and biopreparations; the contagious process and the immunity of the organism; causes of various infections and principles of microbiological diagnostics as well as the significance of the normal human microflora. Knowledge of the significance and application of microbiology for the specialty "Pharmacy"; modern biotechnologies using microorganisms for the preparation of antibiotics and other contemporary medicines; methods of microbiological analysis and control of medicines and biopreparations.

ASSESSMENT: Continuous assessment, written tests, colloquium, examination

